Gully erosion prediction in a Sahelian context

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Abstract

In Sahelian region, concentrated overland flow often leads to the formation of gullies. Although this phenomenon is widespread in those regions, research efforts are still needed to be able to model their spatial distribution and the role of the different parameters involved in this process. In this context, the objectives of this study are twofold. The first step is to investigate to what extent the role of Sahelian soil surface crusts (biological and/or physical) on soil surface infiltrability and detachment affect the formation and development of gullies. The second step is to integrate the results of these investigations in a simple geomorphological model to predict gully location at the watershed scale. The evaluation of the resulting model on two test catchments demonstrated that the integration of soil crusting is a key parameter to insure the quality and relevance of gully prediction. The model is able to distinguish between two types of gullies, those whose width range between 0.5m and 4m and those whose width exceeds 4m. The application of the model at the regional scale is however limited by the resolution of available regional digital elevation model (i.e. the 90m resolution SRTM DEM) which only permits the prediction of large gullies.
Key words: erosion, gullies, Sahel, biological soil crusts, modelling.